

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

E82-10205

CR-148432

"Made available under NASA sponsorship
in the interest of early and wide dis-
semination of Earth Resources Survey
Program information and without liability
for any use made thereof."

STRUCTURE OF THE ST. FRANCOIS MOUNTAINS AND
SURROUNDING LEAD BELT, S.E. MISSOURI:
INFERENCES FROM THERMAL IR
AND OTHER DATA SETS

Quarterly Report 8/1/81 - 10/31/81
NAS5 - 26533

R. E. Arvidson, P. I.
Department Earth and Planetary Sciences
Washington University
St. Louis, Missouri 63130

(E82-10205) STRUCTURE OF THE ST. FRANCOIS
MOUNTAINS AND SURROUNDING LEAD BELT, S. E.
MISSOURI: INFERENCES FROM THERMAL IR AND
OTHER DATA SETS Quarterly Report, 1 Aug. -
31 Oct. 1981 (Washington Univ.) 5 p

N82-23578

Unclass
G3/43 00205

December 15, 1981

1 copy
1 copy
1 copy
10 copies

R. J. Frost, Contracting Officer, Code 269
Publication Branch, Code 251
Patent Counsel, Code 204
J. Broderick, Technical Officer, Code 902

Original photography may be purchased
from EROS Data Center
Sioux Falls, SD 57198

RECEIVED

DEC 15 1981

SIS/902.6

HFO 013

TYPE 2

1. PROBLEMS: No problems impeded the progress of our investigation
2. ACCOMPLISHMENTS: The following HCMM image data sets were the subjects of intense analysis during August, September, and October: A-A0045-19420-2 (Day-IR), A-A0045-A420-1 (Day-visible), and A-A0044-08310-3 (Night-IR). These frames were chosen because they cover our test area (the Ozark Plateau and St. Francois Mountains) and they are cloud free. The data were acquired during June, 1978. Unfortunately, day-night pairs without significant cloud cover do not exist for the winter season.

All three images were contrast-enhanced, using a linear stretch. In addition, the night-time image was de-striped using a box-car filtering approach. Apparent thermal inertia images were generated from the data. The enhanced data and the apparent thermal inertia data were also registered and overlayed onto shaded relief images depicting topography and onto a colored version of the Missouri geologic map.

The significant finding during this reporting period was that the combination of the apparent thermal inertia image and the shaded relief map proved to have the greatest discriminability in terms of portraying linear features. The reason seems to be that the vegetation canopy on the Ozark Plateau is different for hill slopes as opposed to valleys. The hills are covered by oak forest while the valleys are usually cultivated or used for grazing. Consequently, the thermal inertias are different. Also, our apparent thermal inertia images do not have differential heating related to topography removed. Thus, the combination of what are probably intrinsic differences in thermal inertia, and the slope-related effects due to topography, tend to emphasize subtle topographic effects. Merging the inertia image with the topography generates a non-linear enhancement of subtle topographic variations. Figures 1, 2, and 3 show an apparent thermal inertia image, an enhanced daytime IR image overlayed onto topography, and an inertia image overlayed onto topography. The difference in discriminability of linear features, some of which are mapped as faults, is clear.

We are currently in the process of writing a manuscript for the J. Remote Sensing describing these results. Finally, during our meetings with mineral, oil, and gas exploration firms, we have discussed the utility of HCMM, merged with other data, as an adjunct technique for exploration.

3. TOTAL FUNDS EXPENDED 8/1/81 - 10/31/81: \$5,800.00

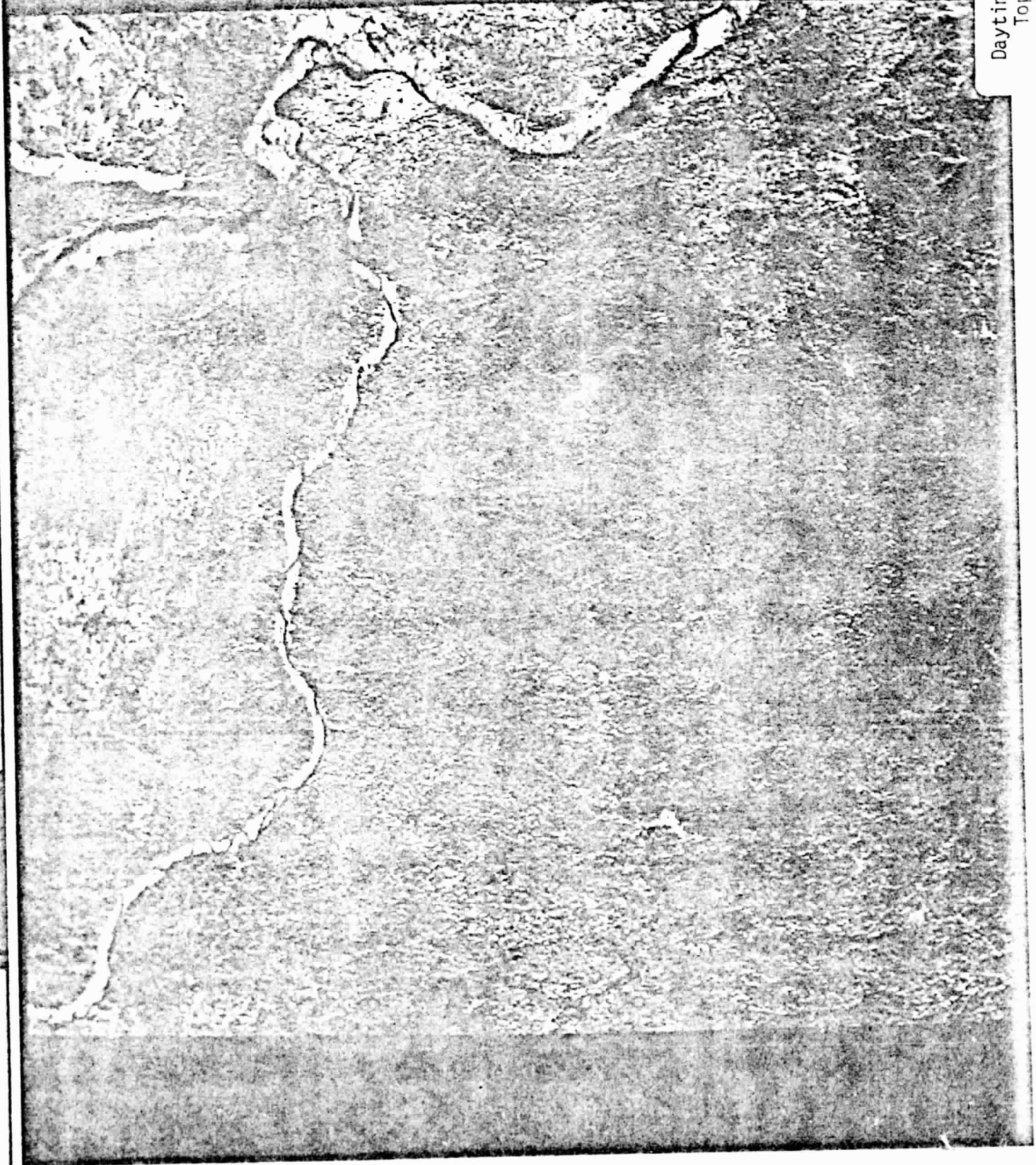
ORIGINAL PAGE IS
OF POOR QUALITY

Thermal inertia ①



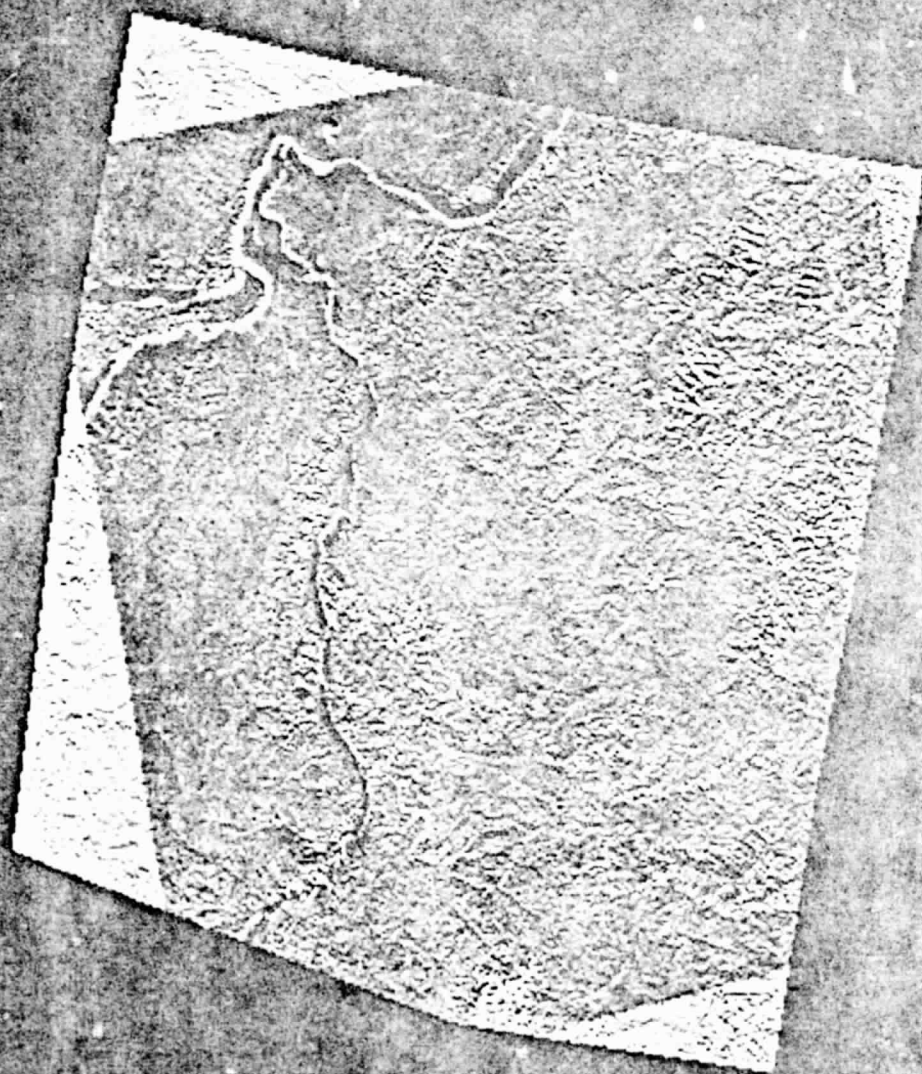
ORIGINAL PAGE IS
OF POOR QUALITY

Daytime IR + (2)
Topography



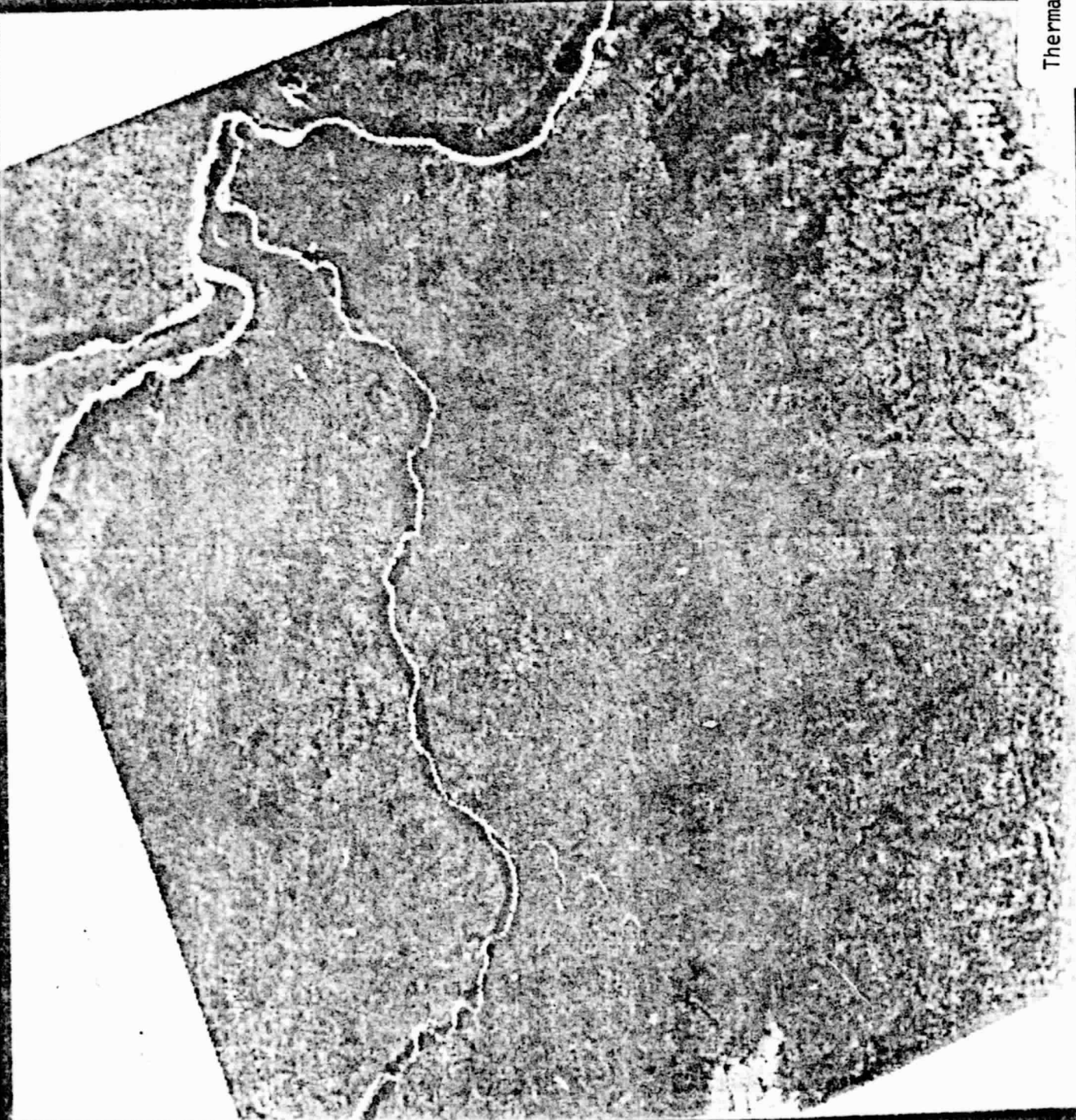
ORIGINAL PAGE IS
OF POOR QUALITY

Thermal inertia +
topography (3)



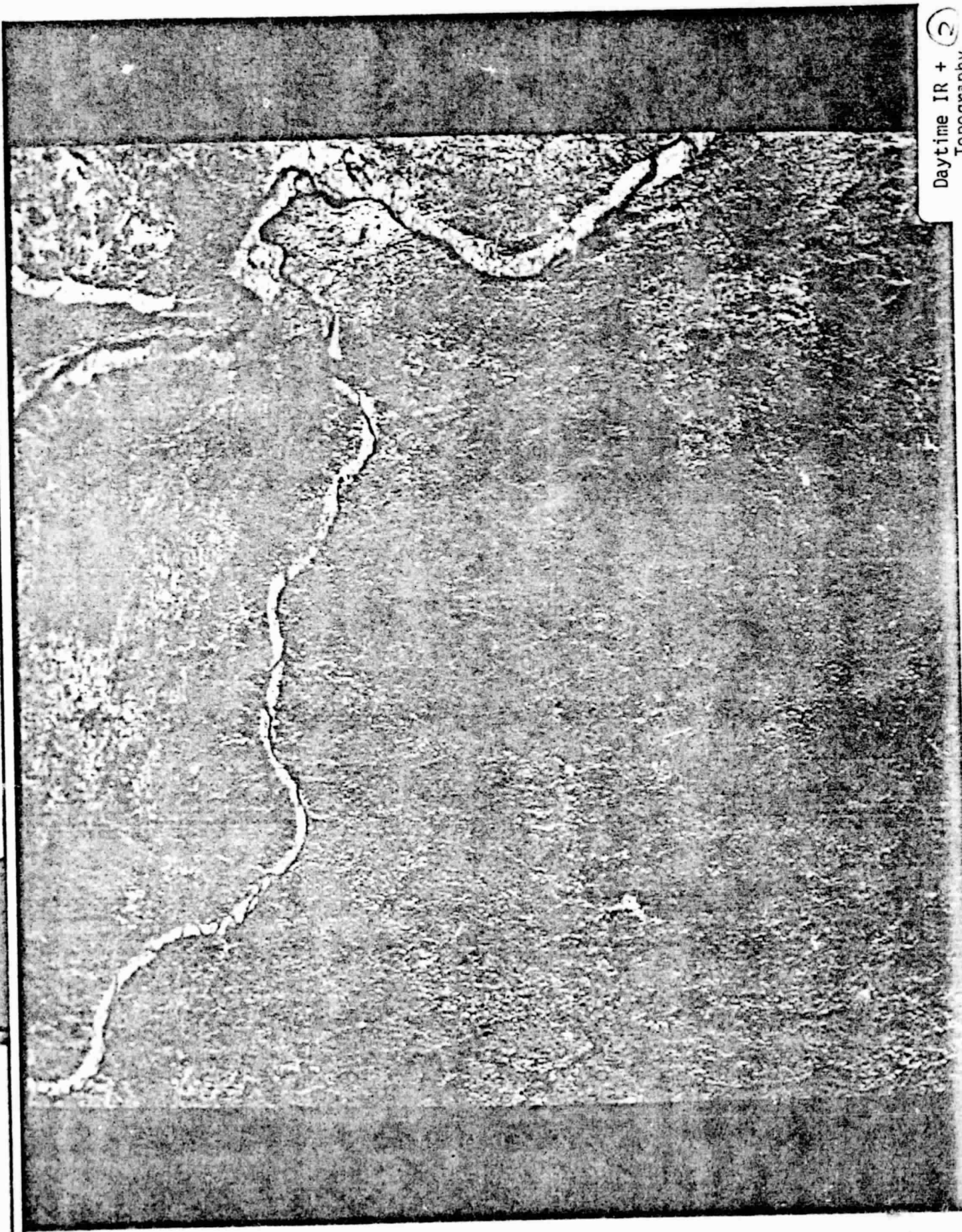
ORIGINAL PAGE IS
OF POOR QUALITY

Thermal inertia ①



ORIGINAL PAGE IS
OF POOR QUALITY

Daytime IR + (2)
Topography



ORIGINAL PAGE IS
OF POOR QUALITY

Thermal inertia +
topography (3)

